

# Problem Solving Tools - Trimming

Module System Modelling and Semantic Web

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# What is Trimming?

- ▶ The change in the automotive industry from dealers to direct sales
- ▶ Lean Management
- ▶ System on a chip

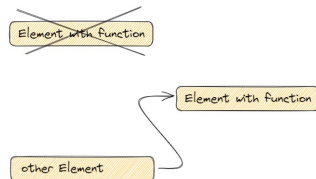


Figure: Trimming Principle

Many processes and products follow the trend of trimming. Often to save costs while maintaining the same function.

## Def. of Trimming

The problem-solving tool trimming attempts to simplify a system in such a way that the same or better function is provided, but elements of the system can be removed.

# Brief overview of contents

- ▶ Basic rules of the Trimming tool and system improvements
- ▶ Prerequisites for trimming usage
- ▶ Case study

# Content Details

- ▶ Basic rules of the Trimming tool and system improvements
  - ▶ for physical Elements in a system
  - ▶ for processes
- ▶ Prerequisites for trimming application
  - ▶ function capture
  - ▶ viable system tests
  - ▶ managing situations where elements are functionally coupled
- ▶ Case studies for systems:
  - ▶ Example of Trimming on a Product

# The Trimming Tool

The system have to be very well known before trimming

Main goal of trimming: to remove unnecessary elements from a system

- ▶ Why don't we eliminate this element?
  - ▶ Do we need the useful function(s) performed by this element?
  - ▶ Can one of the other elements in the system perform the useful function(s) instead?
  - ▶ Could we modify one of the other elements to perform the useful function(s)?
  - ▶ Is there an element or resource around the system that can perform the function(s)?
  - ▶ Is there an element or resource around the system that could be modified to perform the function?
  - ▶ Can we perform the function(s) by combining other elements and resources?

# The Trimming Tool

## Why don't we eliminate this element?

The questions are examined from top to bottom. If questions can be answered positively further up, this usually leads to a more ideal solution.

# Trimming Question 1/6

Do we need the useful function(s) performed by this element?

- ▶ Does the element have any useful function at all? (visible in the FAA)
- ▶ Determine whether the useful functions are actually required
- ▶ Element must not perform other useful tasks in the system
- ▶ Element must not affect functionality of the system in future scenarios

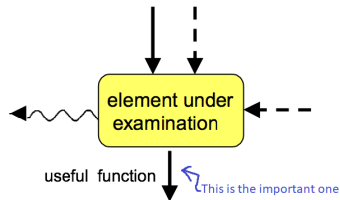


Figure: Useful Outgoing Functions Will Determine Whether the Element can be trimmed



## Trimming Question 2/6

Can One Of The Other Elements Perform The Function Instead?

- ▶ could other elements in the FAA model take over the function of the element we want to trim?
- ▶ Determine whether the useful functions are actually required
- ▶ Start with elements that are most closely connected to the trimmed part
- ▶ from there, work forward to elements in the model furthest from the element

## Trimming Question 3/6

Could We Modify One Of The Other Elements To Perform The Useful Function(s)?

- ▶ Can we modify an element to perform the function?
- ▶ For this it is useful to analyze the evolutionary state of the respective elements.
- ▶ Start with elements that least evolved
- ▶ from there, work forward to elements with less evolutionary Potential

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## Trimming Question 3/6

Could We Modify One Of The Other Elements To Perform The Useful Function(s)?

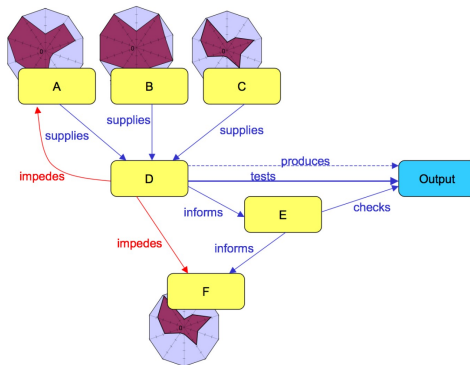


Figure: Evolution Potential Radar Plots For Elements In FAA Model

## Trimming Question 4/6

Is There An Element Or Resource Around The System That Can Perform The Function(s)?

- ▶ look outside the system for resource that directly fulfills the function of the element
- ▶ Problem/Opportunity Explorer analysis -> is there an usable element in this list?
- ▶ resource check-lists: more generally approach
- ▶ pay particular attention to the category of 'low-cost resources'

## Trimming Question 5/6

Is There An Element Or Resource Around The System That Could Be Modified To Perform The Function(s)?

- ▶ look at untapped evolutionary potential in elements or resources outside
- ▶ if a resource outside is evolved, could it perform the required action?

## Trimming Question 6/6

Can I Perform The Function(s) By Combining Other Elements And Resources?

- ▶ combination between two or more existing elements
- ▶ combination between an existing element and one or more outside resources
- ▶ combination between two or more outside resources

# Trimming for processes

Questions are essentially the same as above, just applied to processes.

- ▶ Do we need the useful function(s) performed by this process step?
- ▶ Can one of the other steps in the process perform the useful function(s) instead?
- ▶ Could we modify one of the other existing process steps to perform the useful function(s)?
- ▶ Can we introduce a new, simpler, process step that can perform the function(s)?
- ▶ Can we modify a process step from a different existing system to perform the function?
- ▶ Can we perform the function(s) by combining other process steps?

# Trimming Sequence

Certain guidelines for application of trimming, but they do not tell us which elements can be trimmed in which order.

Rules for this are not yet complete or generalizable, but there are four useful guidelines:

- ▶ elements with the highest number of not wanted functions connected to them are a prime candidate for trimming
- ▶ elements with the highest value offer the biggest trimming benefit
- ▶ highest elements in the functional hierarchy should be prioritized
- ▶ elements that deliver the smallest number of useful functions



# Trimming – The Bigger Picture

There are 3 aspects that are important to check if trimming should be used at all:

- a) function capture
- b) viable system tests
- c) managing situations where elements are functionally coupled

## a) function capture

- ▶ Record all functions present in a system as thoroughly and completely as possible
- ▶ FAA should be comprehensive and preferably validated by more than one person
- ▶ be absolutely sure that ALL useful function arrows are captured, pointing away from the element

## b) viable system tests

Viable System Model (VSM) according to Stafford Beer describes 5 necessary conditions for viability of a system:

- ▶ Implementation
- ▶ Co-ordination
- ▶ Intelligence
- ▶ Control
- ▶ Policy

## b) viable system tests

### Implementation

defined as the parts of the system that are responsible for performing the main activities and can then be subdivided into subsystems, which are again considered viable system

### Co-ordination

Individual elements and the system must communicate with each other. The more they do this and the less is imposed from above, the more autonomously the elements or subsystems function.

## b) viable system tests

### Intelligence

Is the two-way linkage between the primary activity of the system and its environment. This enables adaptation to future, changing environmental influences.

### Control

Defined in VSM as the (two-way) communication between subunit and meta-level.

### Policy

The policy function provides closure to the system as a whole by deifying the overall direction, values, and purpose of the organizational unit.

## b) viable system tests

Key point: If you try to remove one of these essential elements from a system, you basically have to find a replacement for them, because the system is not viable without them.

## c) Coupled Functional Requirements

The complexity of a system increases over time and is then also optimized more and more. The complexity of a system does not correspond to the number of elements. High complexity can also be generated by few elements with many functions.

Trimming must never endanger autopoietic (self-sustaining) capability level of the system

Important questions before trimming an element from the system:

- ▶ Are there any coupled functions?
- ▶ Are there aspects of the element to be pruned that link our system to the system at the next higher level in the hierarchy?

If the answer to either question is "yes," trimming should be used only with caution.

# Example

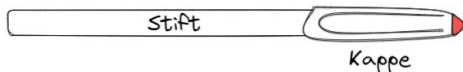


Figure: Example of Trimming on a Product ([www.michael-patra.de](http://www.michael-patra.de))



# References

- 1 Darell L. Mann. Hands-on systematic innovation for Business and Management. IFR Press, 2014